Oliver (F.E.)

From Seventh Report of the Massachusetts State Board of Health.

HEALTH OF BOSTON.

1875.

By F. E. OLIVER, M. D.

BOSTON:
WRIGHT & POTTER, STATE PRINTERS,
79 Milk Street (corner of Federal).
1876.

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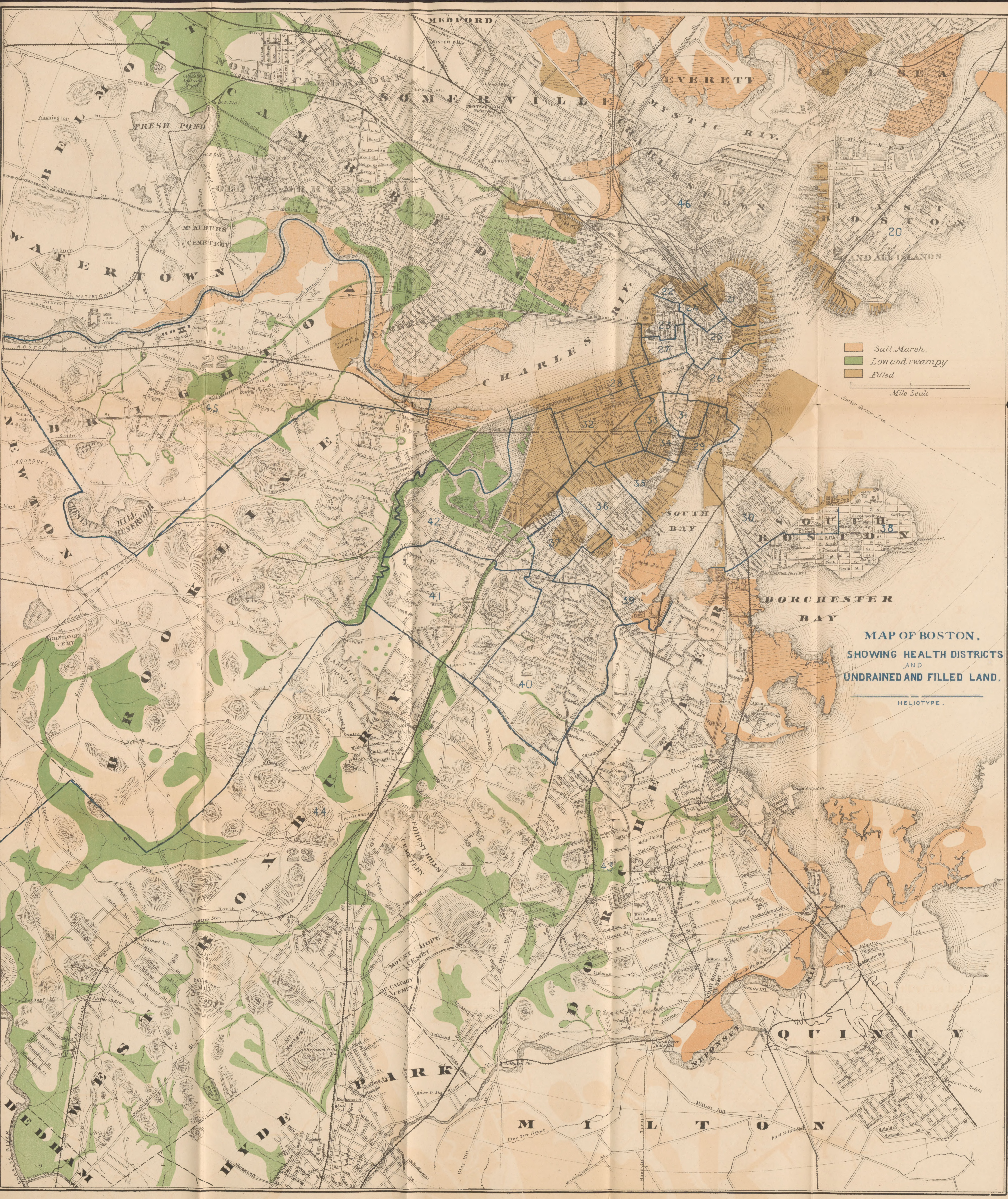
MAP OF BOSTON.
SHOWING HEALTH DISTRICTS
AND
UNDRAINED AND FILLED LAND.
HELIOTYPE.
Salt Marsh.
Low and swampy
Filled
Mile Scale
Harbor Commiss. Line
MEDFORD
EVERETT
CHELSEA
SOMERVILLE
NORTH CAMBRIDGE
OLD CAMBRIDGE
CAMBRIDGEPORT
CAMBRIDGE
BELMONT
WATERTOWN
BRIGHTON
NEWTON
BROOKLINE
ROXBURY
WEST ROXBURY
DORCHESTER
HYDE PARK
DEDHAM
MILTON
QUINCY
CHARLESTOWN
EAST BOSTON AND ALL ISLANDS
SOUTH BOSTON
SOUTH BAY
DORCHESTER BAY
MYSTIC RIV.
CHARLES RIV.
NEPONSET RIV.
CHARLES RIVER
FRESH POND
CHESTNUT HILL RESERVOIR
JAMAICA POND
MT. AUBURN CEMETERY
FOREST HILLS CEMETERY
MOUNT HOPE CEMEY
MT. CALVARY CEMEY
CEDAR GROVE CEMY
HOLYHOOD CEMY
U.S. Arsenal
PUBLIC GARDEN
COMMON
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HEALTH OF BOSTON.*

The somewhat confused state of the registration department, arising from contemplated changes in the mode and management of the mortality registration, has made it a little difficult to obtain an accurate estimate of the mortality of Boston for the past year. As the only returns for the whole year are those of the registrar, these have been adopted, although not entirely accurate, the number of deaths registered by him for the last seven months of the year falling considerably short of that contained in the tables of the City Board of Health.

It appears from the returns of the city registrar that the number of deaths in Boston, in 1875, was 8,954, this exceeding by eleven hundred the number recorded in the previous year, an increase that may be, in part, attributed to the unusual length and severity of the winter, together with extraordinary epidemic influences during the latter part of the year. With a population that may be fairly estimated at 342,000, we have accordingly a death-rate of 26.18 in the thousand living, which is an increase of 2.59 per thousand over

* An attempt was made to compare the mortality of Boston during the past year with that of 1870, using for that purpose the census of 1875, and the "health-districts" into which the city had been subdivided by the late Dr. Derby. It was found, however, that the records of the city registrar did not contain information of sufficient exactness to make it advisable to publish a report based upon those returns.

For that part of the year during which the City Board of Health has preserved the records, statistics of great value have been preserved in a manner to make them accessible and thoroughly to be relied upon, for the first time in the history of Boston. It was hoped that the erroneous results reached in the paper on the mortality of Boston could be rectified, by means of comparison with the accurate records of the Board of Health. It was found, however, at a late day, that this was impossible within the limits of time allowed the writer, and the board regret to be compelled to withdraw a paper of value. The following report, originally prepared for the "Health of Towns," is commended by the board to that careful consideration which the reputation of the writer and its thorough research deserve. [ED.

that of 1874, and of 1.63 over the estimated mean death-rate of Boston. In the mortality tables of the City Board of Health for the seven months ending December 31, 1875, there are 79 more deaths recorded than appear in the returns of the registrar, which, added to those already quoted, give 9,033 as the whole reported mortality for the year, and a death-rate of 26.41; and for Boston, exclusive of the three recently annexed towns, 26.80 per thousand. By further excluding Roxbury and Dorchester, the death-rate rises to 28.32, which is not far from four per thousand above the mean death-rate for Boston previous to the annexation of these five towns.

The high death-rate that has characterized Boston for some years past, is largely due, as is shown in the recent report on the Sanitary Condition of Boston, to the excessive mortality among infants and children under five years of age, the mean death-rate under one far surpassing that of London, and almost equalling that of Liverpool, the most unhealthy of English cities. The year that has now closed is by no means an exceptional one in this respect, the death-rate of infants under one being somewhat above, although that of children under five falls a little below, the mean for the last four census years. The rate above five was also 2.7 per thousand above the mean for the same years, as also considerably above the mean decennial death-rate for London, as appears from the following table:—

Deaths in Boston per thousand living.	1855.	1865.	1870.	1875.	Mean of the four Census years.	London, mean of ten years—1851-1860.
Under 1, . . .	–	265.5	276.9	275.8	272.7	–
Under 5, . . .	99.4	99.2	97.2	86.8	95.6	78.0
Over 5, ...	14.7	15.6	15.5	18.8	16.1	16.6
At all ages, . . .	25.4	23.6	24.3	26.1	24.8	23.7

The diseases that have been most prevalent are phthisis, pneumonia, and three diseases of the zymotic class,—scarlatina, diphtheria, and cholera infantum, to which may be added typhoid fever.

The mortality from phthisis, which was somewhat higher in the first and fourth quarters of the year, was less by seventeen than in the previous year; the percentage of deaths to the whole mortality falling to 14.90, or 3.86 to the thousand living, which is less than the mean death-rate from this disease for the last ten years, and pretty nearly corresponds with the mean decennial death-rate throughout the State, and marking a still further decline in the mortality from this disease, which has for some years been steadily decreasing. The

highest number of deaths (five per thousand) was in the twenty-third district, which comprises the northern slope of Beacon Hill, including the narrow, crowded streets at its base lying between West Boston and East Cambridge bridges. The northern side of this hill is inhabited largely by a colored population, and from its northerly exposure, and the nature of the soil, is cold and damp. From the analysis of the mortality statistics given in the report of the Commission on the Sanitary Condition of Boston, above referred to, it is shown that the high rate of mortality from phthisis is in a great measure due to the large Irish population, who show a marked proclivity to lung affections.

The deaths from pneumonia numbered 666, or more than 100 more than in 1874, and 7.43 per cent. of the whole mortality. This disease was especially fatal in the first quarter of the year, and its prevalence was probably due to the cold and prolonged winter; the average temperature for the first three months being 25.2, which is six degrees lower than during the same period in the previous year. The largest number of deaths was in district 23, where the death-rate was 2.3 per thousand. The lowest mortality was in district 28.

The large mortality from scarlatina and diphtheria was due to epidemic influences, not unaided by local causes, which will be alluded to below. The number of deaths from scarlatina was unusually large, amounting to 530, or 5.91 per cent. of the whole mortality. It was especially fatal in districts 20, 21, 35, 39 and 42, where filth and foul air have for years been allowed to do their legitimate work unmolested. The highest rate of mortality was in Brighton (district 45), where the death-rate was six in the thousand, not an improbable cause of which is suggested by one of our Brighton correspondents.

The deaths from diphtheria gradually increased from 49 in the first three months of the year to 234 in the last quarter, amounting to 418 for the whole year, and making 4.66 per cent. of the entire mortality, and a higher death-rate from this diesase than ever before here recorded. The highest mortality was in districts 38 and 45. No deaths were reported from district 26. Deaths from membraneous croup, which was more prevalent than usual, are not included in this estimate. The death-rate from the latter disease was 0.64 per thousand, or 2.45 per cent. of the whole mortality, being nearly double the mean for the previous ten years.

There were 680 deaths from cholera infantum, which is one more than the number recorded in 1874. These occurred mostly from June to October, inclusive, the highest weekly number being in the first week in August. The districts where it mostly prevailed

were those where it has been observed in previous years,—in overcrowded parts of the city, exposed to every insanitary condition. No case was reported from district 28.

The mortality from all the diarrhœal diseases taken together, including the last mentioned, was 999, which is not far from one-ninth of the whole mortality for the year.

The deaths from typhoid fever were 225, or 2.51 per cent. of the whole mortality, the number reported for the last half of the year being nearly double that of the first six months. Many of the cases are believed to have been imported from the country.

The mortality from the prevalent zymotic diseases, taken together, mainly due to scarlatina, diphtheria and the diarrhœal diseases, although not so high as in 1872, when the small-pox proved so fatal, was considerably above the decennial death-rate from 1865 to 1874, as will appear from the following table:—

Comparative Mortality from Zymotic Diseases in 1875.

DISEASES.		1875.	Mean for ten years.
Cholera Infantum,	Deaths per 1,000,	1.98	1.92
	Per cent. of mortality,	7.59	7.81
Diarrhœal Diseases,	Deaths per 1,000,	0.93	1.03
	Per cent. of mortality,	3.56	4.19
Scarlatina,	Deaths per 1,000,	1.55	0.93
	Per cent. of mortality,	5.91	3.85
Diphtheria,	Deaths per 1,000,	1.22	0.21
	Per cent. of mortality,	4.66	0.86
Measles,	Deaths per 1,000,	0.18	0.13
	Per cent. of mortality,	0.70	0.52
Whooping-cough,	Deaths per 1,000,	0.08	0.20
	Per cent. of mortality,	0.32	0.82
Typhoid Fever,	Deaths per 1,000,	0.65	0.66
	Per cent. of mortality,	2.51	2.64

It is to a few diseases of this class, as has been shown by the able report above referred to, that is largely due the high death-rate of Boston for many years past. More than one-fourth part of the entire mortality the last year is attributable to these diseases; and, as they are believed to be especially promoted by insanitary conditions peculiar to certain localities, the testimony of physicians was requested as to how far they were able to trace the influence of these conditions in the cases that had fallen under their observation. The circular addressed to them contained the following questions:—

1. *Have diphtheria, scarlet fever, and typhoid fever been, in your*

experience, more prevalent or not during the past year than in the preceding year or years?

2. Have you had reason to regard these diseases as due to defective drainage or the presence of sewer-gases in the particular locality where they have appeared, or in its immediate vicinity?

3. Has cholera infantum been especially prevalent during the past summer, and what were the insanitary influences that seemed to you to promote it, or the three above-named diseases, whether in connection with locality, absence of sunlight, defective drainage, overcrowding, or insufficient water-supply, etc.?

4. Please give the localities, including street and number, where you have had cases of the above diseases, and where they have been most prevalent?

Of the physicians who replied to the above questions, there are many who were unable to perceive any connection between these diseases and the conditions referred to. By far the largest number, however, including many of wide experience, regarded their influence on diphtheria and typhoid fever as unquestionable. How far such influences affected the development of scarlet fever, there seems to be a more equal division of opinion. The fact that this disease not unfrequently occurred in places where no local cause could be assigned, may be readily explained by its communicability, and the constitutional proneness that exists in some individuals to zymotic diseases.

The following are quotations from the letters referred to, so far as our limits will allow:—

Diphtheria.—Dr. Bickford, of Charlestown (district 46), after mentioning the alarming prevalence of diphtheria, says, that "nearly every case that I have seen, has occurred in houses with defective drainage which, in this district, is fearfully bad in all houses which have been built from twenty to forty years, or more. They were laid on planks which have become decayed and broken away, allowing the drain to become clogged and the cellars to become filled with the fluids from sinks and water-closets."

Dr. Campbell, of East Boston, writes, that "the most malignant cases of diphtheria and scarlet fever occurred in localities where the drainage is imperfect, although not entirely confined to those places."

"I have, for a year past," says Dr. Cheever, "had recurrent (many times) cases of sore throat in a family of children, in Montgomery Street, which have wholly ceased since a defect in the soil-pipe was discovered and remedied." "I have just lost a patient (three months old) after five days' sickness of an obscure character, but pointing to some obstruction of the throat, and death from exhaustion, in East Chester Park, where sewer-gas is a daily nuisance in the wash-bowls,

and where, in summer, the Roxbury Canal, quite adjacent, has been unparalleled in vileness." Dr. Cheever also mentions "a case of slow and recurrent pneumonia in an infant who, during its sickness, was suddenly seized with vomiting its milk. The milk was prepared and kept in an open bowl, set into the water of the wash-bowl to keep it cool. Over this played a stream of sewer-gas from the overflow pipe—very perceptible; vomiting ceased when the food was removed, the overflow hole puttied up, and the bowl kept full of water."

Dr. Edes states that "the typhoid cases and the diphtheritic croup that he had seen, occurred in a badly drained district."

Dr. Hastings "has noticed more diphtheria and typhoid fever in parts of the city where drainage is imperfect."

Dr. Blood, of Charlestown (district 46), says: "In regard to diphtheria and typhoid fever, I believe the cause of all the cases that I have seen, without exception, to be defective drainage, the presence of sewer-gases being noticeable in or about the houses where the cases occurred." "I would not speak so strongly in regard to the cause of scarlet fever."

Dr. J. B. Ayer mentions cases as occurring at Portland Street (144), where the common sinks contained a great deal of refuse, and often emitted offensive odors. "In Myrtle Street (121), where the odors from the cesspools in the yard were very offensive, and the cellars so foul, that the tenants threatened to leave." "In Porcelain Place, where the cesspool occasionally sends up offensive odors; also offensive at high water."

Other cases are mentioned where no odors were noticeable, or where no inquiry was made as to their existence.

Dr. Nichols, of Roxbury, states that in his experience, "these diseases were decidedly more numerous, and the results less favorable in those districts imperfectly drained, or subject to the action of sewer-gases, or the emanations from the so-called midden-vaults."

"I have noticed," says Dr. Osgood, "for many years, that the above diseases have been much more severe in consequence of these gases, and in some cases, I believe, they were caused entirely by them."

Dr. Whittier attributes these diseases to "both defective drainage and the presence of sewer-gases." A paper was read by Dr. Whittier before the Society for Medical Observation, in October last, which gives four cases of this disease, where these influences were unmistakable in their effects.

The following extract is from a letter of Dr. Goss, of Roxbury:—

"I was called to see, some time in January, a child who was suffering from this disease, in Williams Street, where a child had

died of supposed diphtheria,—not a very severe case. Later in the year, the father had a severe attack of pneumonia, but recovered; still later, a child was taken with the same disease, and died. The mother, who was confined in September, had a tedious convalescence from pelvic cellulitis and other complications. This house is situated in what was formerly a marsh, or a part of a territory comprised in the Roxbury Flats. It is far below the level of the street, with no proper facilities for drainage, and water is standing, much of the time, under the house. I cannot affirm that the unfavorable location of the dwelling had anything to do with the cases of disease occurring therein, but am convinced that this, and many others in its vicinity, are built where habitations should not have been permitted until proper arrangements had been made for drainage."

Dr. C. D. Homans remarks that he has found no special cause for the few cases that he has seen, but "the drainage is defective everywhere."

Dr. Hyndman says: "I have had no reason to attribute the disease to either of the above-named causes." He subsequently states that his practice chiefly lies in the "*north part of the city.*"

Scarlet Fever.—Dr. J. B. Ayer mentions cases of this disease in Cusson Place (2), where the drains empty into the water-closets on each floor, and are often very offensive in summer. "In Cambridge Street (193), where the odors from the drains were very offensive through the summer and early part of the fall; often most intolerable. In Anderson Street and Bridge Court, where the water often rises in the cellar, but without odor."

Dr. Bush states that "the cases of this disease that he had seen occurred in crowded houses, in Middlesex Street, a part of the city that is considered well drained, so far as the street is concerned, but the pipes in the house were insufficient for the amount of work required of them, so that parts of the houses were in a foul condition."

Dr. Fisher mentions a house in Fabin Street where there were three cases and two deaths, and where "the surroundings are not as wholesome as they should be."

Dr. Morrill states that he has had cases of scarlet fever "which seemed to point directly to bad drainage as the only cause, this existing both in the exact locality of the disease, and in its immediate vicinity."

Dr. Street attributes this disease, as well as diphtheria, "to defective drainage, more than to any other cause beyond the control of the tenants."

Dr. Giddings, of Brighton, in allusion to the remarkable prevalence of scarlet fever in that district, where it has proved far more fatal than in any other portion of the city, says: "I am unable to

account satisfactorily for the outbreak of scarlet fever. We have no system of drainage, and cases have occurred with as much frequency in localities where elevation, slope, and soil would favor the disposition of extraneous matters, as in those where the surroundings would seem to favor and perpetuate the poison. There is one fact worthy of note, which may furnish an hypothesis by which we may account for the production of this disease. There is a low, flat piece of land (a sort of semi-meadow) lying along the south line of the Boston & Albany Railroad in Allston. During the fall of 1874 a large amount of compost from a slaughter-house was spread over this low land, and, for a time, for the distance of a mile or more, according to the direction of the wind, the most pungent and sickening and offensive odors prevailed. From that time to the present, scarlatina has prevailed, with an occasional case of diphtheria. I am forced to believe that, from this compost spread over this low land, the poison of scarlatina and diphtheria originated, and has been continued, by the diffusion of the poisonous gases and the principle of contagion."

Dr. Marion, of Brighton, states that he has seen scarlet fever in nearly every street in the district. "The epidemic began here in December, 1874, and raged through the winter months. Through the spring and summer there were only isolated cases. In September, 1875, it commenced again, and continued to increase till January, when it seemed to be at its height. Since then it has been gradually disappearing. In the winter of 1874–75 it was confined mostly to the more elevated portions of the town; during the past winter mostly to Allston; North Beacon Street might be considered the dividing line,—scarlet fever raging south of it in 1874–75, and north of it in 1875–76. During the year I attended one hundred and fourteen cases; of these sixty-three were of Irish parentage."

It will be noticed that the date of the outbreak of scarlet fever corresponds with that given by Dr. Giddings.

Typhoid Fever.—Dr. J. B. Ayer reports a case of typhoid fever in the rear of Spring Street (21), where the cesspool was under the privies, and where the odor in summer was strong enough to require the closing of the windows.

Dr. Belt, of South Boston, thinks that most cases "can be traced to defective drainage from houses to the street."

Dr. Blodgett thinks that the absence of any subterranean drain in a small, sunless court, was an important factor in the causation of the disease.

Dr. Minot mentions a case of this disease "in a boy eleven years old; one of obscure disease, with symptoms of nervous and physical prostration, lasting several months; and two or three cases of slight

indisposition, all occurring in the same family, which were supposed to be caused by sewer-gases escaping from a defect at the junction of the soil-pipe with the house-drain, discovered after the house was vacated."

Dr. Shattuck reports several cases "which appeared to be due to defective drainage."

Dr. Tarbell states that about one-fourth of the cases of typhoid fever that have come under his observation could be traced directly to some local origin; one-fourth only indirectly, and in the remaining half there could certainly be no such cause assigned.

Dr. Walker, of South Boston, mentions "two severe cases, which occurred among the attendants at the lunatic hospital, both of which were attributed to exposure to a foul drain while cleaning and repairing it."

Dr. J. C. Walker mentions "a case of this disease on Highland Park Avenue, where the location was high. The patient had not been into the country, and the disease seemed to be one arising from defective drainage. There was no sewer-drainage in the street."

Cholera Infantum. A very large proportion of the cases reported are believed to have been due to one or more of the causes mentioned in the following extracts from the letters of our correspondents:—

1. "Long-continued and excessive heat, acting on children who have been nourished on artificial food, in crowded and badly ventilated rooms, exposed to decaying animal and vegetable matters, bad drainage, putrefying excrement, and water contaminated with putrescent animal matter, especially soakage from privies.

2. "Offal thrown out of tenement-houses, being allowed to remain and decompose."

3. "Very hot weather in conjunction with unsuitable food and contaminated air. Absence of sunlight, defective drainage, and overcrowding, as also privies and swill-pails."

4. "Overcrowded, dark, badly drained houses."

5. "Overcrowding, absence of sunlight, improper food, improper clothing, want of cleanliness, bad sewerage and carelessness in the removal of refuse matter."

6. "Errors in diet (of 200 nursing-bottles carefully examined, but 20 were proved free from fungi)."

7. "A filthy house."

8. "Defective drainage, locality, overcrowding, in so far as this also implies filth; absence of sunlight."

9. "Overcrowding and improper feeding."

10. "Defective drainage, defects in water-closets, and stagnant water, as in open lots."

11. "Exhalations from filth-water."

12. "Exposure to the heat of a cooking-stove in rooms in the second and third story."

13. "Teething infants fed artificially, bad food, and overcrowding in streets and courts deficient in light and air."

14. "Bad drainage and improper food."

The localities where the above diseases principally prevailed are the same that have long been noted for high mortality rates. Those especially mentioned are districts 20, 21, 22, and 23, corresponding to the old wards 1, 2, 3, and part of 4; districts 29 and 30 to ward 7, which comprises the South Cove territory and parts of South Boston; and districts 35, 39, and 42, comprising wards 10, 13, and 15; also district 45, or Brighton, where scarlet fever proved so fatal. Many of these districts contain either a dense population, crowded into dark, narrow streets, or are characterized by *low, wet* or *ill-drained* land; and the inhabitants are largely composed of foreigners whose habits and proclivities especially predispose them to diseases of the zymotic class. The insanitary influence of new-made land is not apparent, as the highest death-rate reported (31 per thousand) was in district 21, which is upon the original soil, while the healthiest district, 28, is one, the larger part of which, a few years since, was covered by the waters of the Back Bay.

The above testimony is less important as showing a connection between certain insanitary conditions and a dangerous and fatal class of diseases, now generally recognized, than as pointing out the results of defective sanitation at our own doors, and the urgent necessity of such sanitary measures as in many foreign cities have proved so effectual. With a mortality as reported for the past year of 1,200 above the average mortality, that average itself being considerably above the normal death-rate of Boston, as shown by the report above referred to, and with all the facts and recommendations of two commissions before them, an unenviable responsibility rests upon the city authorities, should the warning pass unheeded.

The number of deaths in public institutions was 907, or not far from one-tenth of the whole mortality.

In connection with this subject, it would be amiss not to mention, however briefly, the recent reports of the two commissions just alluded to, one on the Sanitary Condition of Boston, and the other upon the Sewerage of Boston, appointed a year ago or more, under the auspices of the City Board of Health. The publication of these papers, drawn up with admirable care and ability, may be said to mark an era in the sanitary history of Boston, for it cannot be doubted that the suggestions contained in them will receive that attention which the character of the commissioners and the importance of the subject entitle them to.

The first-mentioned report includes a careful analysis of the mortality statistics, showing that the death-rate, which has been thought for some years past to be excessive, is due, in a great measure, to the large mortality among infants and children, as well as the large foreign element, especially Irish, in our population. Nearly two-thirds (58.4 per cent.) of the aggregate population, it is shown, are composed of foreigners and their offspring, of which large proportion two-thirds again (64-6 per cent.) are Irish, who are peculiarly prone to those diseases which act so large a part in swelling our mortality lists. Among these may be mentioned phthisis, pneumonia, Bright's disease, and certain zymotic diseases suggestive of defective sanitation, and appropriately termed "filth-diseases," the latter including cholera infantum, the diarrhœas, and typhoid fever. That portion of the second chapter treating upon the Influence of Nationality upon mortality is of especial interest, as is also the third chapter upon the "Nature and causes of the diseases which occasion our excessive mortality." In allusion to the sanitary needs of Boston, a more complete and accurate system of registration is recommended, and such sanitary measures as shall more effectually counteract the morbific causes that occasion one-fifth of all the deaths that take place, and which are shown to be removable. The most important of these measures is suggested in the following paragraph, which we quote at length :—

"The prevention of filth-infection, in its various forms, constitutes, without any doubt, the greatest and most urgent sanitary need of Boston. The attainment of this end imperatively calls for the adoption of energetic measures designed to prevent all possible contamination of our air, water and food, by the putrefying organic matters of all kinds which constitute 'filth.' Dirt has been defined as 'matter out of place'; so the filth, of which we speak, is but sewage out of place. When confined within its proper channels, and therein, constantly undergoing rapid removal, sewage is harmless, and does not deserve the opprobrious epithet which it incurs under opposite conditions; namely, when stagnating without, or even within, its channels; then poisonous vapors are generated and given off, which convey filth-infection in all its forms.

"By no other means can the purification of our city from filth be encompassed, than *by the rapid and continuous removal* from our midst of all refuse matters, such as constitute sewage, comprising solid and liquid excrements, foul household waters, etc., etc. Any reliance upon 'disinfectants,' as a means of public sanitation, would be but a delusion and a snare."

The appointment of the Commission on Sewerage was in compliance with a request of the City Board of Health. It had long been believed that there is a direct connection between decomposing matter and disease, and the experience of foreign cities had shown that, with an improved system of sewerage, sickness and mortality

had much diminished. It was thought that the time had come when Boston should have a system of drainage commensurate with the necessities of a great and growing city. "The evil of the present system of sewerage chiefly arises," says the report, "from additions being constantly made to the territory of the city, and from the sewers being necessarily extended through these low districts, and on flat grades, without a definite, comprehensive system." Many of them are insufficient for the work required, and others are so low that they cannot be emptied even at low tide. In other cases, there are no tide-gates, the sewers lie low, and the soil is incompletely drained, the cellars are often wet, and the sewer-gases are driven into the houses by the rise of the tide. It is also stated that "twenty millions of gallons of sewage are discharged daily at different points, completely skirting the city, and polluting the atmosphere throughout most of its length and breadth." The plan suggested by the commission is to carry the sewage far out into deep water, where its discharge will be remote from dwellings, by two enormous sewers extending from a point near Cottage Farm Station to the sea, on either side of the city; one to run in a south-easterly direction through the south part of Boston to Moon Island, and the other north-easterly through Cambridge, Charlestown, Chelsea, and Winthrop to its outlet at Point Shirley. It was proved, by experiment, that sewage discharged at these points would not return with the tide. With this system there is a constant and uninterrupted flow of the sewage from the time it enters the sewers until its discharge at the outlets.*

* See the map facing page 232; for the "health-districts," see the map facing page 512.